Wisconsin Highway Research Program
Request for Proposal for

Field Study of Air Content Stability in the Slipform Paving Process

Proposals must be submitted
no later than
Wednesday, March 3, 2010

For further information regarding this RFP
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Researcher Proposal Preparation Guidelines

WHRP Proposal Guidelines are available on the WHRP website (http://www.whrp.org/rfps-and-guidelines.html?current=three&sub=none). Please refer to these instructions in preparation of your response.

I. Background and Problem Statement

The Wisconsin Department of Transportation (WisDOT) has for a number of years required an air content of 7 percent plus or minus 1.5 percent for concrete pavement placed by the slipform paving machine. This requirement came about with the theory that the paver removes approximately one percent in the process of vibrating and consolidating the concrete. So, the long time accepted standard of 6 percent plus or minus 1.5 percent was revised. As the Department moves to performance related standards, the contracting industry would like to investigate the actual impact to the air content through the slipform paver. This would allow the contractors to improve the mix designs submitted and allow for better balance of strength and air properties.

II. Objectives

The objective of this study is to evaluate the impacts to the air void structure and content due to the vibration and consolidation action of today's modern slipform pavers used in Wisconsin. Targeting the correct air content will allow the Department and the paving industry to optimize the properties of the concrete mix in regards to strength and air.

III. Scope of Work

Proposal: In the initial project proposal, the research team will be expected to define the scope for a complete literature search of the topic, define the testing methods for air content to be used in the study, define their draft experimental design, and explain the rationale for this design. The research team should also state as part of this experimental design, the total number of different field PCC mixtures that will be tested within the defined budget for this study and the proposed coordination with the contracting industry for collection of data.

Task 1: Researcher will conduct a comprehensive literature search on the topic, make final recommendations for testing air in the field and report results back to the Rigid Pavement Technical Oversight Committee.

Task 2: Based upon the literature search and the meeting with the Technical Oversight Committee (TOC), the Researcher shall develop a detailed final testing matrix for measurement of air contents on paving projects. Final selection of projects in which testing will be performed will be in consultation with WisDOT staff.
Task 3: will include the field work and all testing required for the project and measurement and documentation of concrete properties in the required testing matrix. The research team will be responsible for all aspects of materials, equipment and transportation to and from the construction projects selected. All project personnel on the construction projects will have HTCP PCC Level I certification.

Task 4: will include analysis and summary of all test data, preparation of final report and formal presentation of the project to the Rigid Pavement Technical Oversight Committee.

Required Concrete Properties to be Included in Test Matrix:
The following fresh concrete properties shall be measured per the cited specification procedures:

- Air Content (AASHTO T152)
- Unit Weight (AASHTO T121)

The following hardened concrete properties shall be determined per the cited specification procedures:

- Compressive Strength of Concrete (AASHTO T22)
- Determination of Air-Void Content and Parameters of Air-Void System in Hardened Concrete (ASTM C457)

Requirements for Test Matrix

Mix Variables
The projects selected for field measurement must include a full factorial of the following mix types in the test matrix

- Northern WI aggregate mix
- Southern WI aggregate mix
- Air entraining admixture

Northern coarse aggregate type shall be a typical northern WI glacial gravel. Southern coarse aggregate shall be a crushed limestone.

Documentation of the type and manufacturer of the air entraining admixture is required.

Types of Equipment

Paving Machines
The projects selected for field measurement must have the goal of including different types of slipform paving machines and different contractors.

- Guntert and Zimmerman S850 – Zignego Company and Michels Paving
- Gomaco GHP2800 – Trierweiler Construction, Vinton Construction
- Gomaco GHP2600 – Chippewa Concrete Services, Ptaschinski Construction
- Rexcon Town and Country – Owned by most pavers in Wisconsin

Concrete Plants
The projects selected for field measurement must have the goal of including different types of concrete mixing plants.

- Rexcon – Owned by most pavers in Wisconsin
- Erie-Strayer- Zignego Company

It is anticipated that there will be significant coordination required with the Wisconsin Concrete Pavement Association and its members in order to find the project mix by paving companies, equipment and aggregate type.

WisDOT/TOC Contribution: TOC contact will consult with research team in final selection of projects.

Requirements for Laboratory/Technician Certifications: HTCP PCC Tech I

IV. Specific Results, Findings, Tools, etc. (Deliverables)

a) Reporting Requirements. 36 Hard Copies Delivered to WHRP by the contract end date.
b) Presentation Requirements. All projects require the PI to give a closeout presentation after submittal of the draft final report.

V. Budget and Time Frame

a) Proposed Project Duration is 18 months. (starting October 1, 2010 and ending March 31, 2012)
   - Deadline for submittal of draft final report is December 31, 2011.
   - Deadline for submittal of Final Report is March 31, 2012.
b) Project Budget shall not exceed $80,000.

VI. Implementation

a) This study will develop recommended values for concrete properties to be used by the Department in the Standard Specifications for Highway and Structure Construction and the applicable Standard Special Provisions, QMP for Concrete Pavements and QMP for Ancillary Concrete.
b) Researcher is expected to communicate the following:
   i) Recommended potential changes in practice.
   ii) Benefits in terms of performance and cost savings.